CHAPTER TWELVE

Fish and Fishing

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1 Introduction

The benefits of fish in the human diet have long been recognized. With an average protein content of 18–22 percent and other important elements (essential amino acids, calcium, flourine, iodine, iron, phosphorus; Vitamins A, B, and D), fish have been an important component of the low-protein, high-carbohydrate diets that have been common in the Near East throughout the pre-Modern era (Englund 1990: 7 n33; see in general Van Neer 1994). Nowadays, the benefits of Omega 3 fatty acids in fish oil are promoted for their ability to help the body combat everything from Alzheimer's disease to cancer, ulcers, and many more afflictions. Nevertheless, considering the fact that the region dealt with in this volume contains long stretches of shoreline on at least seven seas (Aegean, Mediterranean, Black, Red, Caspian and Arabian Seas, and the Persian Gulf), as well as a number of major rivers (Tigris, Euphrates, Karun, Orontes, Khabur, Balikh, Jordan, Greater Zab) and lakes (e.g., Lake Kinneret, Lake Van, Lake Parishan, Hamun-e Helmand), not to mention thousands of manmade irrigation canals, neither freshwater nor saltwater fish in Near Eastern antiquity have received the attention that they deserve. The purpose of this chapter is to provide a broad overview of a number of issues associated with fish. Topics discussed below include fish remains in archaeological contexts; evidence of fishing sites; fishing techniques and equipment; written sources on the organization of fishing; fish preparation for consumption and the dietary contribution of fish in antiquity;

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fish iconography; and the symbolic role of fish in ancient belief systems. While no claim is made to complete coverage of this extensive subject, examples have been drawn intentionally from a wide range of chronological periods and habitats across the ancient Near East.

2 Fish Remains in Archaeological Contexts

Fish appear in the archaeozoological record at sites of all periods, in all parts of the Near East. Fish skeletons, or parts thereof, including fins, and especially vertebrae, are capable of surviving in archaeological deposits for thousands of years, and there is perhaps no better example of this than Gesher Benot Ya'aqov, a 750,000-year-old Middle Pleistocene site with Acheulian (Old Stone Age) stone tools in the northern Jordan Valley, near the shore of a seasonal freshwater paleolake (Lake Hula). With more than 2,500 identified specimens, 99 percent of which are carp (Cyprinidae), concentrated in two loci, one of which is near a hearth, it is clear that these fish do not represent a "natural-death assemblage" – which would look very different (Zohar et al. 2001, 2008) – but rather a deposit created by anthropogenic activity (Alperson-Afil et al. 2009: 1679), most probably cleaning and eating. While the depositional conditions and taphonomy of every site are to some extent unique, the evidence from Gesher Benot Ya'aqov makes a mockery of claims that "fish bones rarely survive" (Singh 1974: 59). Indeed, it would be more accurate to say, "archaeologists and their workmen rarely take the trouble to recover fish bones" in their quest to excavate the architectural complexes, whether private houses, palaces, temples, or other structures, that seem more exciting.

The underrepresentation of fish in the archaeological record reaches a level of absurdity in the case of sites located close to a water source but at which fish remains seem curiously to be absent. One must question whether it is credible that the inhabitants of the Early and Middle Bronze Age settlements at Tall Habuba Kabira (north of the better known, 4th millennium BC site of the same name), although living by the banks of the Euphrates, largely avoided eating fish, as suggested by the presence of only three fish bones in an assemblage of c.5,000 identified bones. Is this a true reflection of their diet, or did 20th century archaeologists simply not employ the careful recovery techniques, including wet-sieving using fine mesh, required to prevent fish bones from ending up on the spoil heap instead of in the lab? Indeed, the fallacy of supposing that the inhabitants at Tall Habuba Kabira ate little fish is exposed by the fact that many copper fishhooks were discovered at the site (Sahrhage and Lundbeck 1992: Fig. 21; von den Driesch 1993: 54). Similarly, given what we know from cuneiform sources about fishing in Mesopotamia (see below), the six fragments of fish bone from the twelfth season of excavations at Nippur (Boessneck 1978: 162) or the 57 fragments from Tell al-Hiba (ancient Lagash) (Mudar 1982: 29), let alone the 85

fish bones from the large, multi-period site of Uruk in southern Iraq as of 1984 – after more than 30 seasons of excavation (Boessneck et al. 1984: 184) – can certainly not be considered a true representation of fish consumption at these sites. Nor do the 15 recovered fish vertebrae from Neolithic levels in the SH area at Ras Shamra (Blot and de Contenson 1992) seem at all representative of dietary practices on the coast of the Mediterranean. By way of contrast, a small excavation (in six squares, each 2 × 2 meters) in the shallow, prehistoric site of Al Markh on Bahrain, where wet sieving was undertaken, yielded an estimated 100,000+ fish bones (Roaf 1976: 150; cf. von den Driesch and Manhart 2000).

These remarks are simply meant to emphasize the fact that fish bones are undoubtedly underrepresented in archaeological deposits, not because they were not there, or because the ancient peoples of the region didn't eat fish when available, but because of coarse excavation and recovery methods. This is not to say, of course, that fine-grained excavation and sieving techniques will miraculously make fish bones appear on every site. At the Pre-Pottery Neolithic A (PPNA) settlement of Göbekli Tepe in southeastern Turkey, for example, the sieved deposits yielded very few fish bones, suggesting that fish genuinely made only a small contribution to the ancient diet there (Peters and Schmidt 2004: 208).

Still, in all parts of the ancient Near East less than a short distance from a coast, river, lake, or canal, fish consumption was universal. Fish bones have been recovered at a long list of archaeological sites in the region, but while overviews exist for mainland Anatolia, the Turkish Euphrates and Tigris basins, Syria, Iraq, and the southern Levant in prehistory (e.g., Van Neer et al. 2005), as well as for the Persian Gulf and coasts of Oman (Beech 2004), comparable reviews are lacking for western Arabia and Iran, and more generally for the periods between the end of the Bronze Age and late Antiquity. As noted above, the use or ignoring of appropriate recovery techniques – effectively whether or not wet-sieving was carried out – have distorted the data that shows the real distribution of species and the intensity of their exploitation, so that the literature is very uneven. At the largely 1st century AD site of ed-Dur in the United Arab Emirates (Van Neer and Gautier 1993), roughly 40 taxa have been identified, while at Saar, on Bahrain, about 25 taxa have been recognized (Uerpmann and Uerpmann 2005a: Table 8.2), and on Failaka island, in the bay of Kuwait, about 11 taxa are documented in both Bronze Age and Hellenistic occupations (Desse and Desse-Berset 1990: Figs. 10–12). In southern Mesopotamia the first lexical texts consisting of the names of different types of fish appeared during the Uruk III period (c.3100–2900 BC). The Archaic fish list contains around 80 entries representing the names of both different "species" built on the base sign SUḪUR, with the addition of modifiers like "split" and "dried" (Englund 1998: 94). An Early Dynastic fish list with at least 101 entries has been reconstructed from numerous copies found at Ur, Fara, Abu Salabikh (for fish remains from the site see von den Driesch 1986), Nippur and Ebla (Pettinato 1981: 91–104; Veldhuis 2004: 149–51).

Texts dating to the Ur III period (2100–2000 BC) contain the names of about 48 different types of fish (Sumerian **ku**$_6$) (Englund 1990: 214–15, 220–1).

Such lists of fish species or taxa should not, however, be taken at face value. Thus, in some cases where speciation in the ichthyofaunal assemblage appears to be very diverse, this is not the case when the totality of species in a given environment is taken into account (e.g., at Qalat al-Bahrain: see Van Neer and Uerpmann 1994: 450). Furthermore, species variety may belie the fact that just a few large fish, such as tuna or sturgeon (Sokolov and Tsepkin 1996), may have provided the overwhelming bulk of the fish protein consumed at a site. Because of environmental change, ancient fish populations, as represented in archaeological finds, do not always replicate modern ones in the same area, and yet it is striking that in some cases, such as Bahrain, the fish species favored in the marketplace today – emperors (Lethrinidae) and groupers (Serranidae) – are the same as those preferred by Bronze Age palates (Uerpmann and Uerpmann 2005a: 295).

Fish consumption in the later periods is well attested. To cite just a few examples, Talmudic sources confirm the consumption of a large carp known as *shibuta* (*Barbus grypus*), the "salmon of the Tigris," as well as many other types of fish (Oppenheimer 1983: 533, with refs) amongst the Jewish population of Babylonia during the first centuries AD (Zivotofsky and Amar 2006). Fishing and fishmongering were major occupations in the Byzantine period at Constantinople (Dagron 1995), in central Anatlolia (Ervynck et al. 1993), and in Israel (H. Lernau 1986; O. Lernau 1995).

3 Evidence of Fishing Sites

Although it is a generalization to say so, most excavations undertaken before the 1960s in the Near East focused on large impressive sites with standing architecture, on sites which could yield cuneiform tablets or major historical monuments, or on prehistoric sites with exceptional painted pottery. Not surprisingly, most of these, with the exception of a few, like Byblos, were in the continental portions of the region, away from the coastlines. In recent decades, however, the number of coastal sites, fronting the Mediterranean, the Persian Gulf, and the Arabian Sea, has grown markedly, particularly in the Persian Gulf, where sites of all periods have been excavated using modern excavation and retrieval methods. These have often yielded a great quantity of fish remains. Just as importantly, their excavators have demonstrated a serious desire to analyze and understand human adaptations to marine environments. In the process, a number of sites have been identified and excavated which, if not exclusively fishing or fish-processing sites, were certainly inhabited by groups that devoted a good part of their time, even if only seasonally (see below), to fishing. What these sites lack in standing architecture, they more than make up for in stratified deposits rich in fish remains (Uerpmann and Uerpmann 2005b). Examples include the

5th millennium sites around Khor, in Qatar (Desse 1988); Dalma island off the coast of Abu Dhabi (Flavin and Sheperd 1994); and the late Neolithic site of Ra's al-Hamra 5 on the coast of Oman, where a range of fish, from large tuna (Scombridae) to sardines and anchovies, were consumed (Charpentier 1996: 182). Recently, sites at which fishing was an important subsistence activity have also been excavated on the coasts of Yemen at Gihayu (Roselló-Izquierdo et al. 2005) and Israel at Atlit-Yam (Zohar et al. 2001).

Some fish, like tuna, are migratory. Hence their presence or absence in a particular locale may have determined whether a site was permanently or only seasonally occupied (Biagi and Nisbet 2006). In a region like southern Arabia monsoonal rains between May and September increase plant growth and biomass, leading in turn to a growth phase in fish. Further north, where the effects of the monsoon are not felt, the rainy season is between November and March, and the best fishing season is, accordingly, around November/December (Wilkens 2005: 127). The effect of the summer monsoon can be detected in the southern Omani province of Dhofar, where migratory species like the large tuna (*Thunnus albacares*) were helped along by a westerly current coming from the direction of India in the period between April and October. This would have been the season in which they were caught, therefore, at Khor Rori (ancient Sumhuram) between the late 1st century BC and the 5th century AD (Wilkens 2002; 2005: 130). However, the migratory patterns of some species coming from a variety of climatic zones must also be considered and it should not be assumed that the migratory cycles of fish today necessarily reflect ancient patterns (Uerpmann and Uerpmann 2003). Nevertheless, growth rings on fish vertebrae are a valuable tool in determining the season in which a fish was caught and reflect the competence and experience of ancient fishermen. At Ra's al-Hadd 6, for example, a 5th millennium settlement near Muscat, the growth rings on excavated fish vertebrae suggest that most fish were caught in the optimal fishing season (November/December), and only very few at any other time of the year (Wilkens 2005: 127), though some scholars dispute the idea that fish vertebrae exhibit discernible evidence of growth increments (M. Uerpmann, pers. comm.). At Sumhuram most of the tuna caught were taken in October–November, corresponding with their arrival on the monsoon current (Wilkens 2002: 272). Further west, along the southern coast of Arabia, tuna were also popular at Qani' at approximately the same date (von den Driesch and Vagedes 2010).

A number of ancient ethnographic descriptions of *Ichthyophagi*, or "fish eaters," survive. Herodotus (1.200) wrote of three Babylonian tribes that "live entirely from fish, which they catch and dry in the sun." More detail is available on the *Ichthyophagi* of the Makran coast of Baluchistan, ancient Gedrosia. This is preserved in the account of the voyage made by Alexander the Great's admiral Nearchus from the mouth of the Indus westwards in 325/324 BC (Arrian, *Indica* 29.8–30; cf. Diodorus Siculus, 3.15ff; Longo 1987). The *Ichthyophagi* have also provided inspiration for scholars working in the Oman peninsula (Costa 1988).

The presence of a particular kind of fish at an archaeological site is often helpful in environmental reconstruction. For example, the presence of snow trout (*Schizothorax* sp.), a fish found in higher elevations, at Shahr-i Sokhta in Iranian Sistan, close to a large lake (Hamun-e Helmand), can probably be explained by the fact that it came via the smaller rivers entering the lake from the mountains to the west (Bökönyi and Bartosiewicz 2000: 143), thus showing that these were probably flowing in the 3rd millennium BC. Similarly, at the Pre-Pottery Neolithic B (PPNB) site of Wadi Tbeik in the southern interior of the Sinai peninsula, the discovery of a type of catfish (*Clarias* cf. *anguillaris*) and a type of water fowl known as the purple gallinule (*Porphyrio porphyrio*) are both suggestive of a moister climate with marshes or swamps, standing water, and reed beds (Tchernov and Bar-Yosef 1982: 34).

4 Fishing Techniques and Equipment

Studies of modern fisheries employ the concept of catch-per-unit-effort (CPUE) in attempting to gauge the scale and importance of fishing, both economically and nutritionally, to a population. However, any comparison of the higher CPUE of the modern era and the undoubtedly lower CPUE, using far simpler equipment, of antiquity can be misleading. As some writers have pointed out, because of a depletion of fish stocks in the modern era, a much higher CPUE is required to achieve yields that are economically worthwhile, but "it is quite possible that a *smaller* fishing effort in antiquity would produce a substantially *larger* catch than those of modern times" (Jacobsen 2005: 100).

It is not clear how the earliest fishermen caught their fish. For example, the stone tool assemblage at Middle Pleistocene Gesher Benot Ya'aqov was dominated by choppers, scrapers, and awls (Alperson-Afil et al. 2009: 1680), none of which seems particularly suited to catching and killing fish. These fishermen may have used wooden spears, but this is purely speculative. On the other hand, fishing without any kind of equipment, in which the fisherman dives into a reed "island" and catches fish one by one with his bare hands, is attested in Iraq (Jawad 2006: 10; cf. Wright 1969: 16–17). From the Neolithic period onwards, however, whether fishing in the open sea (requiring boats), from the beach, by the shores of a lake, or on a river, early fishermen employed a variety of equipment, including the hook-and-line, nets, traps, and spears, each of which is attested in the archaeological and/or literary sources.

Fishhooks made of mother-of-pearl from the pearl oyster shell (*Pinctada margaritifera*) are particularly diagnostic of sites on the Arabian Sea coast of Oman (e.g., Suwayh 2 and 4, Ra's al-Jins 2 and 40, Ra's al-Hadd 5, Khor Milkh 1, Ra's al-Khabbah 1) and the Persian Gulf coast (e.g., Akab) from the early 5th through the 4th millennium BC when they were supplanted by copper fishhooks (Charpentier and Méry 1997: 149–50 and Fig. 2). As the discovery of mother-of-pearl

fishhooks in various stages of manufacture at Akab on the Persian Gulf coast of Umm al-Qaiwain attests, these hooks were used in the shallower waters and lagoons of the Persian Gulf as well as in the deeper waters of the Arabian Sea (Charpentier and Méry 2008: 123). The variable dimensions of these hooks, some of which are more than 5 centimeters long, probably reflects the fact that they were made with specific fish in mind, whether inhabitants of the coast, sheltered lagoons, or the open sea (and indeed the inventory of taxa represented at sites on the coast of Oman, such as Ra's al-Hadd 6 and Ra's al-Jinz 1 [Wilkens 2005: Table 3] confirms that a range of different zones were being fished). A series of etched indentations along the uppermost part of the hook would have served in attaching a fishing line (Charpentier et al. 1998: 30). Although the materials used for lines have not been identified, plant and/or animal fibers were probably used. In the 19th century, cotton was used in eastern Arabia to make fish nets, while *Calotropis* (silk tree) fibers were used to make twine and rope (Reade and Potts 1993: 103).

From the Bronze Age onwards copper or bronze fish hooks were widespread, appearing not only at coastal sites in the Persian Gulf like Tell Abraq (Potts 2000: 63) and Umm an-Nar (Beech 2004: Figs. 47–52) in the UAE, and Saar on Bahrain (Moon 2005: Fig. 5.3g–m), but at riverine settlements like Susa, on the Karkheh (ancient Ulai or Eulaios) river in southwestern Iran, where datable examples of the 4th and 3rd millennia BC are attested. Many of these have a barbed tip, much like a modern fishhook (Tallon 1987/2: 196, nos. 361–70). Comparable examples have been excavated in Mesopotamia at Uruk, Tello, Ur, Kish, Jamdat Nasr, and Nippur in the south, and Tell Asmar in the Diyala region (Tallon 1987/1: 154–6; van Ess and Pedde 1992: 5 and Taf. 1.1–6; contra Paul 1978: 186, who suggested that fishhooks "were all but unknown in Mesopotamia"), where they could have been used for fishing in the northern Persian Gulf (Telloh, Ur), the Diyala river (Tell Asmar), on the Tigris, Euphrates, and their ancient branches, or in manmade irrigation canals (Jamdat Nasr, Kish, Nippur, Uruk). Further afield, examples are known from Habuba Kabira on the Syrian Euphrates, Alalakh in southern Turkey, and Megiddo in Israel (van Ess and Pedde 1992: 5, with refs).

As demonstrated by the recovery of thousands of anchovies, herrings, and sardines at Ra's al-Hamra 5 near Muscat (Uerpmann and Uerpmann 2003), casting nets were in use by the 6th millennium BC on the coast of Oman (Charpentier 1996: 182). In Arabia, such nets have not survived in the archaeological record, although their existence is confirmed by an enormous quantity of excavated net-sinkers. The simplest of these are made from stones, often of a fairly uniform size, that have been worked so that they have a transverse groove to assist in tying them to the net (Charpentier and Méry 2008: 123 and Fig. 8.1–8; cf. Charpentier et al. 1998: Fig. 8). Fragments of a preserved fishing net, along with dozens of fired clay, doughnut-shaped net sinkers, 7 centimeters in diameter, and a wooden float "used to keep the upper edge of the net near the surface of

the water", were found in a small room (L 43: 7) adjacent to the mid-3rd millennium BC temple oval at Khafajah in Iraq (Delougaz 1940: 54–6, Fig. 54; cf. Galili and Rosen 2008: 68 for possible wooden floats from a wreck in the east Mediterranean dating to the 7th century AD). In this case, the nets were probably used to fish in the nearby Diyala river, an eastern tributary of the Tigris. A few similar ceramic disks have been found at Haçinebi, a small Chalcolithic site on a bluff overlooking the Euphrates in southern Turkey (Keith 1998: 507). Much later, lead fish net-sinkers were used. These are attested, e.g., in the Late Bronze Age Uluburun shipwreck off the coast of Turkey (Pulak 1998); at Caesarea and in a Roman wreck off the Carmel coast of Israel (Galili et al. 2002); and in a 7th century AD fishing boat excavated off Dor in Israel (Galili and Rosen 2008: 69 and Fig. 5). Fish net-sinkers of stone, fired clay, and lead are also known from at least the 6th century BC to the 4th century AD in the northern Black Sea region (Højte 2005: 135).

Although no identification of the Khafajah net fibers was published, the twist of the netting is clearly visible and one net-sinker still has a part of a net wrapped around it and tied off (Delougaz 1940: Figs. 53, 55). In the Ur III period ox tendons were used to make nets (Englund 2003: §18), while in Hellenistic and Roman Galilee nets were made of flax (Hanson 1997).

Nets are generally classified as cast nets, requiring a single fisherman; surface gill nets, requiring 2–4 fishermen; and seine or dragnets, requiring 15–20 fishermen (Jawad 2006: Table 2). These types are used in different environments for particular target species. In Oman, individual catches of 15–20 kilograms per throw using a cast net from the shore have been reported (Bekker-Nielsen 2005b: 86 and n.9) though this far exceeds the 2–3 kilograms estimated for cast net usage in southern Iraq (Jawad 2006: Table 2). According to the New Testament, both the cast net (*amphiblêstron*, Matthew 4:18), used from a boat or thrown from the shore, and the seine (*sagênê*, Matthew 13:47), thrown from a boat, were used in Roman Galilee (Hanson 1997). According to Nearchus, the *Ichthyophagi* on the Makran coast used nets made "from bark of the date-palm, twisting the bark like twine" (Arrian, *Indica* 29.10). But instead of setting sail and cropping their nets at sea, the fishermen of the Makran coast used the nets to catch fish that had been stranded in hollows on the uneven tidal plain: "When the sea recedes and exposes the land, the fish are not found as a rule where the earth is left dry, but where there are hollows some water is left, containing a very large number of fish, mostly small, but some large ones too, which they catch by throwing nets over them" (Arrian, *Indica* 29.11). At Neolithic Çatal Höyük in Turkey, where more than 16,000 fish bones have been recovered from a wide variety of contexts, including "midden deposits, floors, pit fills, ashy spreads, oven rake-outs, as well as alluvial deposits," the source was the adjacent Çarsamba river (Van Neer et al. 2005: 141). Given the sizes of the fish consumed, and the fact that only one fishhook has been found at the site, basket (see below) and/or net-fishing is presumed to have been the norm.

Fishing with hook-and-line as opposed to casting nets was not an either/or situation. Both techniques were employed according to the microenvironment. For example, in Oman large hauls of herrings and anchovies were caught in the recent past using nets thrown from the beach. Nearby fishing for individual tuna with hook-and-line could be done from a high cliff, while boats were used for more systematic fishing (Uerpmann and Uerpmann 2003).

Fishing with spears offered an alternative to individual hook-and-line fishing. In the recent past, fishing spears were favored by the Marsh Arabs of southern Iraq. According to Philby (1959: 67):

> [T]heir fishing is done entirely by tridents, consisting of a three-pronged bit of metal fixed to the end of a long reed, with which the fisher, standing at the prow of his canoe and intently watching the depths below him as it floats slowly by, stabs the water with a sharp, straight, downward stroke.

An illustration of fishing with a spear can be seen on an Early Dynastic (mid-3rd millennium BC) cylinder seal in Berlin (Sahrhage 1999: Abb. 48). The scene depicted is of two men standing in a boat, one in the stern who propels it using a punting pole and the other in the bow who holds in his raised hands a spear with a fish at the end. What has been interpreted as a three-pronged fishing spear appears occasionally as a symbol on Mesopotamian cylinder seals from the Early Dynastic, Old Akkadian, Old Babylonian/Old Assyrian, and Neo-Assyrian periods (Black and Green 1992: 85). In the *Halieutika* of Oppian (composed c.177–80 AD), a Roman treatise on maritime fishing that draws on both Aristotle and Leonidas of Byzantium (fl. c.100), the author wrote of using fishing spears with trident-like tips to catch young tuna, swordfish, whales, and small sharks (Bekker-Nielsen 2005b: 89). The use of the data contained in the *Halieutika* is complicated by the fact that although Oppian came from Cilicia on the Mediterranean coast of Turkey, the fishing practices he described were not necessarily those of his own lifetime or homeland (Bekker-Nielsen 2005b: 84). A five-pronged, iron striking-head of a fish spear weighing over 0.5 kilograms was found in the 7th century shipwreck off Dor in Israel (Galili and Rosen 2008: 70 and Fig. 6).

Finally, fish traps were probably used widely, but, whereas modern ones are often made of wire, ancient ones were made of organic materials and hence have left no trace in the archaeological record. At the Epipaleolithic site of Ohalo II, dating to c.21,000 BC, on the banks of the Sea of Galilee, the variation in body size of barbels or carp (*Barbus* sp.) has been interpreted as a sign that different fishing techniques, including traps, may have been used at the site (Van Neer et al. 2005: 139). The existence of woven reed fish traps has been assumed in southern Mesopotamia, largely because of their depictions on Egyptian wall reliefs (Sahrhage 1999: 99 and Abb. 47). Diodorus Siculus (3.22) described the use of fish traps in southern Babylonia during the Parthian period that were made of woven reeds like baskets. The Sumerian literary composition known as *The*

home of the fish seems to be a song intended to entice fish into entering a "house" and it has been suggested that "the text becomes meaningful if we imagine the fisherman reciting, or better singing, the text, while he places his trap in the river and waits for his catch. In this case the 'house' would actually turn out to be a metaphor for a weir, and the description of it as an attractive house simply serves the purpose of trapping the fish" (Thomsen 1975: 199). Low stone walls made of beach rock, off the coast of Abu Dhabi, have been interpreted as fish traps, but their date is unknown. Certainly their position in an intertidal zone has suggested a date after 1000 AD, but they could be even younger (Beech 2003a: 294 and Figs. 1–2).

5 Written Sources on the Organization of Fishing

Although fishing undoubtedly began as an individual, periodic activity, it evolved in some regions into a professional one that was, in some cases, highly organized. This was particularly true in Mesopotamia, where we have detailed documentation of fisheries run by state and temple institutions. These sources appear as early as the Uruk III period at Uruk where the Archaic professions list contains two sign combinations that may designate a foreman of fishermen (GAL SUḪUR) and a fisheries administrator (SANGA SUḪUR) (Englund 1998: 143). During the Early Dynastic period the temple of the goddess Bau at Girsu (modern Telloh) in the territory of Lagash (Bauer 1998: 542–51) presided over a number of fisheries supervisors who, in turn, administered units of both freshwater and saltwater fishermen, the former busy on the canals and lakes and the latter, a numerically larger group, subdivided into brackish water, coastal, and "fishermen, who throw a net," presumably denoting open water fishermen (Bauer 1998: 542). A text from the reign of Lugalanda shows that fishermen were required to make monthly deliveries consisting of 130 "fish for the offering table," as well as periodic "fish payments" for the "Feast of the Malt(-eating)" honoring Ningirsu and the "Feast of the Barley(-eating)" honoring Nanshe. These latter payments included four baskets of fish (presumably small fish that were not counted individually but by the basket-load), about 1 liter of fish oil and 10 turtles. In the first year of Lugalanda's reign, 44 fishermen received wool rations. These included 30 coastal fishermen, 6 brackish water fishermen, 3 open-water fishermen, and 5 fishermen attached to the household of the chief temple administrator (Bauer 1998: 543). A text from Lugalanda's second year shows that each saltwater fisherman had to deliver 480 fileted fish, 600 **sumaš**-fish, 10 turtles, and 1 liter of fish oil, though it is not clear in what timeframe, while a further entry in the same text calls for monthly deliverys of 200 fileted and 160 fresh fish per fisherman (Bauer 1998: 545). It was the fisheries supervisors' responsibility to achieve the targets set by the temple, and a number of accounts summarize the debits and credits of these supervisors (Englund 1990: 91–6).

Exactly what happened to these fish after their delivery is unclear. References to storage houses – the "House with the roof" or "House with the roof for fish" – are rare, but fish must have been preserved in some way (dried, smoked, or salted; see below). The fact that fish from Girsu were sent to temples in other cities (Bauer 1998: 550) also implies regular fish preservation, as does a text from Garshana mentioning three construction workers who were sent to Guabba to buy fish on a trip that lasted between 14 and 19 days (Heimpel 2009: 316–17). Normally, fish were not disbursed as rations to workers. On special occasions, like the festival of the goddess Bau, temple staff received fish along with bread, beer, and fat as special rations. Similarly, a couple of centuries later, workers participating in the reconstruction of the Ekur (temple of Enlil) at Nippur received what seems to have been an extraordinary allotment of 1,183 fish filets and 1,070 liters of dried fish, as well as sheep, vegetables, salt, beer, dates, and apples, possibly upon completion of the project (Westenholz 1987: 33–4; cf. Potts 1984: 265). Occasionally, dried fish were given to builders at Garshana in the Ur III period (Heimpel 2009: 316).

More likely than not, however, most of the fish at Girsu were consumed in the daily meals prepared for the deities, an important function performed by the personnel of each temple who presumably ate the fish themselves after dedicating them to the deities. The fisheries supervisors exercised considerable control over the fishermen in their service. In return for their annual performance, supervisors received allotments of wool and barley which they, in turn, disbursed as rations to both freshwater and saltwater fishermen (Englund 1990: 91). The basic picture of fisheries administration gleaned from the Girsu texts is similar to that seen later, albeit with more detail, during the Ur III period (Englund 1990) and indeed at Uruk during the Neo-Babylonian (c.900–539 BC) periods (Kleber 2004). A somewhat different situation seems to have obtained at Ur during the Old Babylonian period (early 2nd millennium BC), where independent fishermen operated in waters controlled by the Nanna-Ningal temple, effectively leasing the fishing rights to these areas. Although they were required to deliver a weekly payment in fish, it appears that the Ur fishermen of the Old Babylonian period were entitled to retain any surplus caught (Butz 1978–9: 35).

6 Fish Preparation for Consumption and the Dietary Contribution of Fish in Antiquity

The need to prevent fish from spoiling was probably always paramount since fish "begin to deteriorate in a few hours of being caught," though this can be prolonged if the fish are gutted immediately (Bekker-Nielsen 2005b: 88). Methods varied greatly, from sun-drying in arid regions and pressing into blocks to packing in salt and pickling (Sahrhage 1999: 149–50), and once discovered were used continuously throughout history (Hanson 1997). Cuneiform sources contain

terms for salted fish (Salonen 1970: 262, 287; Potts 1984: 234) and during the Ur III period fish were smoked as well (Englund 1990: 217–18).

For the ancient inhabitants of sea coasts, river valleys, and lake shores who were in a favorable position to exploit fish resources on a regular basis, preservation may have been initially intended to enable the storage of fish for consumption at some date beyond that of the catch, whether a few days, a few months, or even longer. That some kind of preservation processing began very early in the Near East is illustrated by the Natufian site of Hatoula, which is located in the Judean hills of Israel about 28 kilometers from the coast of the Mediterranean Sea (Lechevallier and Ronen 1994). Not only did the amount of fish consumed there increase steadily from the Natufian through the PPNA, but almost all the species registered were maritime (Lernau and Lernau 1994). Clearly, these fish were being caught and transported inland, presumably in a preserved condition. During the 1st millennium BC strings of fish are referred to in Babylonian sources (Kleber 2004: 143). Sun-dried, smoked, and salted fish could probably have all been carried on cords or strings when it was necessary to transport them and, as we know from numerous Mesopotamian texts, baskets were used to hold and transport fish as well.

In the Natufian period it is probably unwise to speak of "trade" in preserved fish, and many scenarios involving related kin-groups or gift exchange between unrelated groups might be invoked to explain how fish were distributed from the coast to inland sites. Nevertheless, the ability to preserve fish was the first step in a process leading ultimately to commercial trade in fish. In the eastern Mediterranean, the fish trade is probably attested by the Bronze Age. Sites like Megiddo, Jerusalem, Lachish, Tel Harassim, Tell Jenin, and Tel al-Wawayat, each of which is anywhere from 5 to 50 kilometers from the sea, have yielded fish remains. Most importantly, these came not only from the Mediterranean but from the Nile, suggesting that the trade in Nilotic fish (Van Neer et al. 2005: 148), which was so important in the later periods, had much earlier roots. At the same time, landlocked sites in Anatolia, including Sirkeli Höyük (20 kilometers from the sea) and Kilise Tepe (40 kilometers from the sea), were in receipt of fish from the Mediterranean (Van Neer et al. 2005: 149). This pattern continued into the later periods as well. During the Roman and early Byzantine periods, catfish (*Clarias gariepinus*) from the lower Nile river in Egypt were being sent to and consumed at Sagalassos in southwestern Turkey (Arndt et al. 2003). Pelusium, in the Nile delta, was a noted center of the fishing industry that exported both fish oil and fish eggs in the late Roman period, according to Talmudic sources, as was Apamea in Syria and Akko and Caesarea in Palestine (Sperber 1968: 265, 267).

Apart from hearths and midden deposits containing burnt fish bones, we have very little evidence of the actual cooking techniques used to prepare fish. The Mesopotamian culinary texts are notoriously silent on the subject (Bottéro 1995: 16), although several Ur III texts refer to fuel "for cooking fish" (Heimpel 2009: 316) and the verb "to cook fish" is attested as well (Kleinerman and Owen 2009:

104). A fermented fish sauce (Akkadian *šiqqum*) was popular (Reynolds 2007: 180) and is attested at least by the late 3rd millennium BC (Englund 1990: 218 n684, 225). Ur III texts record some of the ingredients that went into it, including **gazi** – possibly licorice or mustard seed – and fine salt (Kleinerman and Owen 2009: 57, 105). Fish sauce continued to be popular in later periods as well. According to Pliny, the Judeans were associated with a type of processed fish known as *castimoniarum* (*Natural History* 31.95) and the town of Taricheae on the Sea of Galilee, listed by Josephus as one of the three largest in Galilee at the time of the First Jewish Revolt (66–74 AD) (Josephus, *Vita* 123, 203) owed its name ("processed fishville" or "fish factory") to its fish-processing industry (Hanson 1997). Fish sauce (Latin *garum*) consumed at Herodian Masada (Cotton et al. 1996) was imported from southern Spain and *garum* vessels have been found at the Nabataean capital Petra in Jordan as well (Studer 1994). The 10th century *Geoponica* (20.46.1–5), which used a variety of earlier Hellenistic and Roman works, described the method of making *garum* in Bithynia (northwestern Asia Minor) (Hanson 1997).

Although nutritious, fish and shellfish can cause a variety of dental and oral health problems. At Ra's al-Hamra 5 in Oman, for example, a sample of 49 individuals displayed extreme dental wear caused by the incorporation of sand and grit in the fish and shellfish consumed there (Macchiarelli 1989). The positive side of this situation, however, was a very low incidence of antemortem tooth loss and caries. Other sites in the region with a more varied diet, consisting of both marine and terrestrial foods, showed only moderate wear but somewhat higher caries rates (Littleton and Frohlich 1993: 444 and Table 8).

In addition to the archaeological evidence of fishing, fish processing, and fish consumption described above, the study of carbon- ($^{13}C/^{12}C$), nitrogen- ($^{15}N/^{14}N$) and sulfur- ($^{34}S/^{32}S$) stable isotope ratios in bone collagen has become an increasingly exploited technique to aid in the reconstruction of the contribution of fish to the ancient diet (Ambrose 1993; Bocherens et al. 2000; Privat et al. 2006). These ratios reflect the ecosystem from which the protein resources consumed by a human population derived. As such, it becomes possible to estimate the relative contribution of different protein resources to the diet, such as the meat of terrestrial herbivores (sheep, goat, cattle), plants, and fish. A growing body of evidence from ancient Near Eastern sites illustrates the utility of this approach. Stable isotope analysis, for example, has revealed that fish made little contribution to the diet of the Late Bronze Age, Iron Age, and Sasanian/Early Islamic-era inhabitants of Geoktchik Tepe, a site located about 80 kilometers east of the Caspian Sea in southwestern Turkmenistan (Bocherens et al. 2006). This conclusion was also mirrored by the very small number of fish bones recovered there in excavation (Mashkour 1998: Table 1).

Trace element analysis was employed in tests conducted on material from Shimal, in the northern United Arab Emirates (UAE), where human bones from three tombs were analyzed. As these could not be directly associated with a spe-

cific settlement (although a settlement existed in the vicinity, it is not absolutely certain that all the individuals interred in the tombs came from the settlement), it was not possible to look simply at the faunal remains from the settlement to infer the diet of the population interred in the tombs. Trace element analysis revealed a shift from a broad diet incorporating fish, shellfish, and terrestrial fauna (principally sheep and goat), to one that was more narrowly focused on marine resources during the course of the 2nd millennium BC (Grupe and Schutkowski 1989).

Fish oil deliveries are well attested in Mesopotamian cuneiform sources, although fish oil manufacture is not. However, the consumption of fish oil can be detected through residue analysis. Studies of ceramics using gas chromatography-mass spectrometry (GC-MS) have been successful in isolating lipid residues from fish oils absorbed into porous ceramic surfaces (Brown and Heron 2005; Privat et al. 2006) and while this has been carried out in Europe and Central Asia, its applicability in the Near East is clear.

7 Fish Iconography

Like many types of Near Eastern fauna, painted, carved, and incised images of fish appear on a wide array of objects, such as pottery, stone vessels, cylinder seals, and reliefs dating to many different periods (see generally with references to many images of fish in different media, Sahrhage 1999). To name just a few examples, fish appear on early 3rd millennium painted pottery of so-called Susa D type from southwestern Iran (Amiet 1966: 149); on the early 2nd millennium BC rock relief at Kurangun in Fars (Seidl 1986); on an early 1st millennium BC soft-stone beaker found in an Iron Age grave at Jebel Buhais in Sharjah, UAE (Sharjah Museums Department 2008: 54–5); and on cylinder seals of many different periods in the greater Mesopotamian region (e.g., von der Osten 1934: 103, with numerous refs; van Buren 1948: Pls. 15–18).

8 The Symbolic Role of Fish in Ancient Belief Systems

Fish remains have been found in a number of ancient Near Eastern temples and these have often been interpreted as offerings to deities (van Buren 1948). In the sequence of superimposed temples dating to the Ubaid (c.6000–4000 BC) period at Eridu in southern Mesopotamia, the excavators found what they considered "fish-offerings, of which there were such ubiquitous traces" (Lloyd and Safar 1947: 94). A typical Ubaid tortoise vessel found in a niche behind the Eridu Temple VIII altar "was full of fish-bones" (Lloyd and Safar 1948: 119). Undoubtedly, fish were brought into sacred buildings for at least two reasons: to feed the clergy and to be sacrificed in offerings. At Saar, on Bahrain, for example, burnt

fish remains were found around several altars and bone fragments were found on top of one altar (Moon and Irving 1997: 82). Fish remains were found in the Barbar temple on Bahrain as well (Bangsgaard 2003: 12–14). Elsewhere, the fish may have been the remains of meals eaten, but at Girsu they seem to have been stored in the "Maison des fruits," possibly for eventual use as offerings, or possibly for human consumption. French excavators in the late 19th century found "whole yellow bundles of fully preserved fish skeletons, complete with skins and scales" (Englund 1998: 130). Depictions of fish on a "table-shaped altar with crossed legs" on Mesopotamian cylinder seals have been interpreted as offerings (von der Osten 1934: 103 and nos. 437, 440).

The three-pronged trident, interpreted as a fishing spear (van Buren 1948: 101; Black and Green 1992: 85), appears on cylinder seals and is thought to have been a divine symbol, though the divinity represented by it is unknown. According to the Sumerian literary composition known as *The home of the fish*, the goddess Nanshe was the "queen of the fishermen" (Thomsen 1975: 199). Thus, there is at least a possibility that the three-pronged trident may have been one of her symbols.

In the Old Babylonian period, the figure of the fish-man or fish-centaur (Akkadian *kulullû*) appears in Mesopotamia (Wiggermann 1992: 182). Statues of fish-women (Akkadian *kuliltu*) in the Nabu temple of Nimrud are referred to in a Neo-Assyrian administrative text (Wiggermann 1992: 182). Beginning in the Kassite period (mid-2nd millennium BC) in southern Mesopotamia, the "fish-garbed figure" or fish-*apkallu* – a standing, bearded human male wearing the skin of a fish, its head mounted like a hat and its scaly body extending down over the shoulders and back, tail extending below the waist – appears, becoming more common in the art of the Neo-Assyrian period (Green 1986; Feldt 2005; cf. Foxvog 2007 for possible 3rd millennium precursors). These are not depictions of priests wearing fish-like garb, but, rather, mythological beings described in cuneiform texts as "creatures of the apsû" – i.e., the primeval, subterranean waters beneath the Earth, and "carp of the sea . . . who were grown in the river" (Wiggermann 1992: 76). A fish-goat (Akkadian *suḫurmāšu*) is also well attested (Green 1986). Figurines of these figures were used in apotropaic rituals, and they sometimes appear on Neo-Assyrian reliefs, as protective spirits.

The spread of Christianity had a marked influence on fish consumption in those parts of the Near East with Christian populations. Although the Christian calendar included more than 100 fasting days per year, when meat was not meant to be eaten, the consumption of fish, shellfish, and crustaceans was allowed (Balon 1995: 33). In order to ensure a ready supply of fish, monasteries began farming some varieties, such as carp, in ponds, following the Roman tradition of the *piscina* (Kron 2008: 206–13).

An early 2nd millennium BC text from Mari, written in the voice of the god Dagan, reads: "Then I, Dagan, will make the Benjaminite sheikhs wriggle/writhe in a fisherman's basket and deliver them in front of you" (Paul 1978: 189).

Although some scholars have likened this to the common metaphor of being packed as tightly as sardines in a tin, it seems more likely to refer to the helplessness of fish once they have been caught and taken out of the water, thereby removing any hope of escape.

9 Conclusion

The dietary and economic importance of fish in the ancient Near East is apparent in most periods, as is the evidence of fishing as an important occupation, whether part time or full time. Studies of subsistence in areas with rivers, lakes, and seas or oceanic coastlines that do not adequately address the role of fish can never adequately represent the lifeways of their ancient inhabitants. Moreover, fish played an important role in the symbolic world of the ancient Near East, even if our insights into that role are dependent on the existence of written records, a resource that is lacking in the prehistoric periods and in many aliterate parts of the Near East. Studies of fish remains have become more and more prevalent and sophisticated in recent decades, and these demonstrate the enormous potential inherent in this often undervalued body of data.

GUIDE TO FURTHER READING

Aside from the almost innumerable reports on faunal remains from archaeological excavations containing references to fish, a sample of which is referred to above, there exist a number of book-length studies on fishing in prehistoric eastern Arabia (Beech 2004), the Black Sea region (Bekker-Nielsen 2005a) and Mesopotamia (Sahrhage 1999). For a broader history of fishing around the world, see Sahrhage and Lundbeck 1992. For an introduction to the methodology of analyzing fish remains from archaeological contexts, see Brinkhuizen and Clason (1986) and Van Neer (1994). For a detailed, authoritative analysis of fishing in Mesopotamia during the Ur III period, largely based on the cuneiform evidence, see Englund (1990). Salonen (1970), which surveys the cuneiform evidence from all periods, must be used with care as it contains a great deal of misinformation.